Altistart 48 soft start - soft stop units

Taming *energy*

Catalogue
February
2002

Square D
Telemecanique

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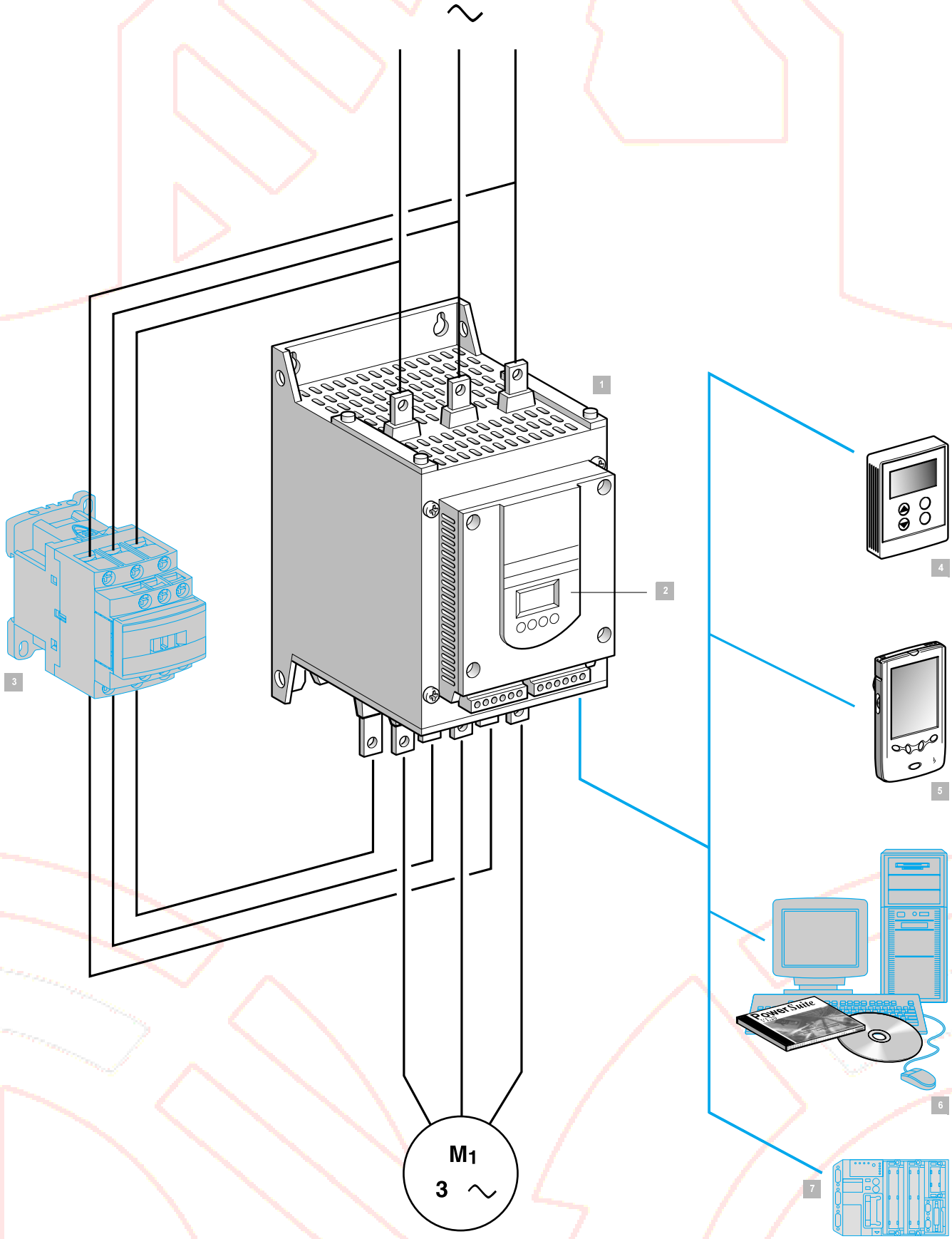
Soft starters

Altistart 48 soft start - soft stop units

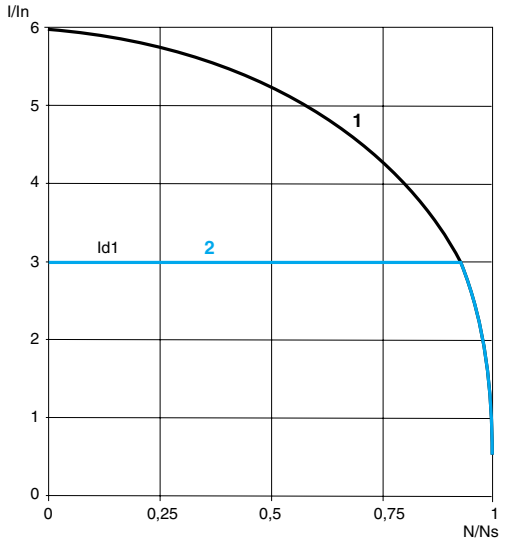


Torque characteristics

Curves indicating changes in the torque depending on the starting current of a three-phase asynchronous motor.
Curves 1: direct line starting
Curves 2: starting in current limiting mode
Torque curve Ts1 indicates the total torque range available depending on the limiting current Is1.
Limiting the starting current Is to a preset value Is1 will reduce the starting torque Ts1 to a value which is almost equal to the square of currents Is1/Is.
Example:
For motor characteristics: Ts = 3 Tn for Is = 6 In,
limit the current to Is1 = 3 In (0.5 Is)
resulting in a starting torque Ts1 = Ts x $(0.5)^2$ = 3 Tn x 0.25 = 0.75 Tn

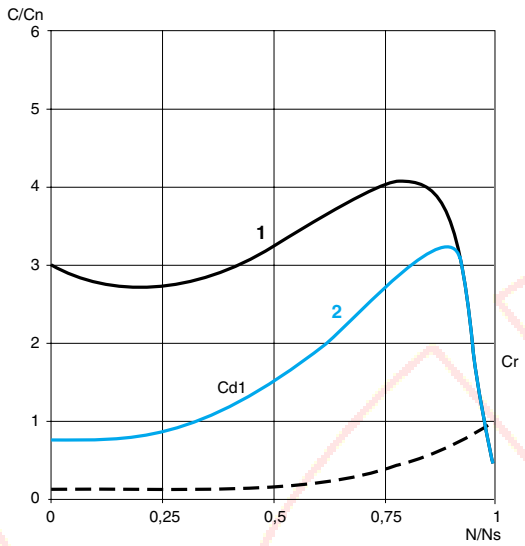
Starting current

1 Direct line starting current
2 Starting current limited to Is1



Starting torque

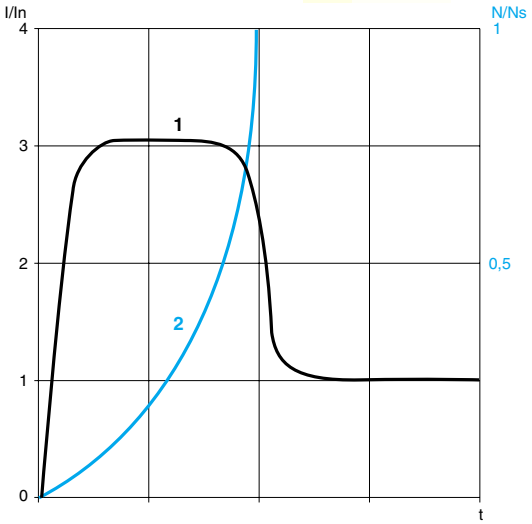
1 Direct line starting torque
2 Starting torque with current limited to Is1



Conventional starting using current limitation or voltage ramp

With current limitation Is1, the accelerating torque applied to the motor is equal to the motor torque Ts1 minus the resistive torque Tr.
The accelerating torque increases in the starting range as the speed changes and is at its highest at the end of acceleration (curve 2).
This characteristic means that the load is taken up very abruptly, which is not recommended for pump type applications.

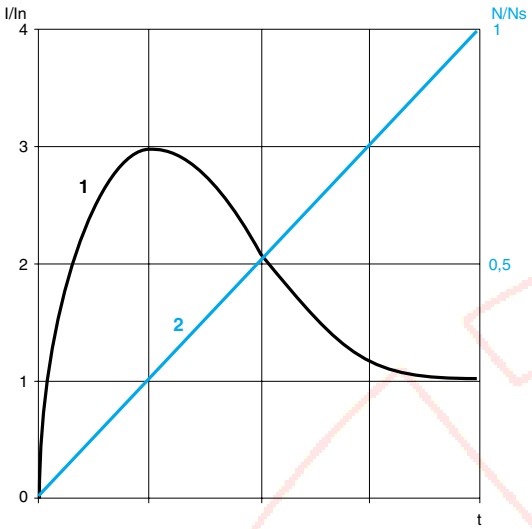
Example of speed curve for starting with current limitation
1 Current applied to the motor (I/In)
2 Motor speed N/Ns



Starting with the Altistart 48

Torque control on the Altistart 48 applies the torque to the motor during the entire starting phase if the current required (curve 1) does not exceed the limiting current.
The accelerating torque can be virtually constant over the entire speed range (curve 2).
It is possible to set the Altistart in order to obtain a high torque on starting for a rapid motor speed rise whilst limiting its temperature rise, and a lower accelerating torque at the end of starting for gradual loading.
This control function is ideal for centrifugal pumps or for machines with high resistive torque on starting.

Example of speed curve for starting with torque control
1 Current applied to the motor (I/In)
2 Motor speed N/Ns



Stopping with the Altistart 48

- Freewheel stop: the motor comes to a freewheel stop.
- Decelerated stop: this type of stop is ideal for pumps and can be used to effectively reduce pressure surges. Torque control on the Altistart 48 reduces the effect of hydraulic transients even if the load increases. This type of control makes adjustment easy.
- Braked stop: this type of stop is suitable for high inertia applications as it reduces the stopping time of the machine.

Special uses

Other criteria can influence the selection of the Altistart 48:

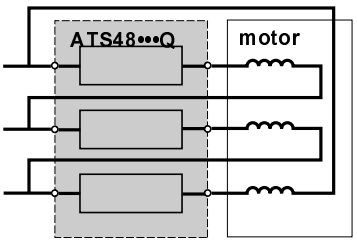
Starter wired to the motor delta terminal

(see the recommended application diagram on page 26)

In addition to the most frequently encountered wiring layouts, where the starter is installed in the line supply of the motor and the motor is connected in star or delta configuration, the Altistart 48 ATS48•••Q can be wired to the motor delta terminal in series with each winding (see the application diagram below). The starter current is lower than the line current absorbed by the motor by a ratio of $\sqrt{3}$. This type of installation enables a starter with a lower rating to be used.

Example: For a 400 V/110 kW motor with a line current of 195 A (nominal current for the delta connection), the current in each winding is equal to $195/\sqrt{3}$, i.e. 114 A. Select the starter rating with a maximum permanent nominal current just above this current, i.e. 140A (ATS48C14Q for a standard application).
To avoid making this calculation, simply use the table on page 13.

This type of installation only permits freewheel stopping and is not compatible with the cascade and preheating functions.



Starter wired in series with the motor windings

Note: The nominal current and limiting current settings as well as the current displayed during operation are on-line values (so do not have to be calculated by the user).

Caution: For this type of installation, observe the wiring scheme and the associated recommendations on page 26.

Starter bypassed by a contactor

(see the recommended application diagram on page 25)

The starter can be bypassed by a contactor at the end of starting (to limit the heat dissipated by the starter). The bypass contactor is controlled by the starter and the current measurements and protective mechanisms remain active when the starter is bypassed.
The starter is selected on the basis of the 3 main criteria and one of the following criteria:

- If the starter is bypassed at the end of starting, the motor is always started from cold state and the starter can be oversized by one rating.
Example: Select an ATS 48D17Q for an 11 kW motor in a standard 400 V application.

- If the starter must be able to operate without the bypass contactor at the end of starting, it does not have to be derated.
Example: Select an ATS 48D17Q for a 7.5 kW motor in a standard 400 V application.

Soft starters

Altistart 48 soft start - soft stop units
Line voltage 230/415 V
Connection in the motor supply line

106762

ATS 48D17Q

106761

ATS 48C14Q

106758

ATS 48M12Q

For standard applications

Motor		Starter 230/415 V - 50/60 Hz				
Motor power *(1)*		Nominal current (IcL) *(2)*	Factory setting current *(4)*	Power dissipated at nominal load	Reference	Weight
230 V	400 V					
kW	kW	A	A	W		kg
4	7.5	17	14.8	59	**ATS 48D17Q**	4.900
5.5	11	22	21	74	**ATS 48D22Q**	4.900
7.5	15	32	28.5	104	**ATS 48D32Q**	4.900
9	18.5	38	35	116	**ATS 48D38Q**	4.900
11	22	47	42	142	**ATS 48D47Q**	4.900
15	30	62	57	201	**ATS 48D62Q**	8.300
18.5	37	75	69	245	**ATS 48D75Q**	8.300
22	45	88	81	290	**ATS 48D88Q**	8.300
30	55	110	100	322	**ATS 48C11Q**	8.300
37	75	140	131	391	**ATS 48C14Q**	12.400
45	90	170	162	479	**ATS 48C17Q**	12.400
55	110	210	195	580	**ATS 48C21Q**	18.200
75	132	250	233	695	**ATS 48C25Q**	18.200
90	160	320	285	902	**ATS 48C32Q**	18.200
110	220	410	388	1339	**ATS 48C41Q**	51.400
132	250	480	437	1386	**ATS 48C48Q**	51.400
160	315	590	560	1731	**ATS 48C59Q**	51.400
–	355	660	605	1958	**ATS 48C66Q**	51.400
220	400	790	675	2537	**ATS 48C79Q**	115.000
250	500	1000	855	2865	**ATS 48M10Q**	115.000
355	630	1200	1045	3497	**ATS 48M12Q**	115.000

For severe applications

Motor		Starter 230/415 V - 50/60 Hz				
Motor power *(1)*		Nominal current *(3)*	Factory setting current *(4)*	Power dissipated at nominal load	Reference	Weight
230 V	400 V					
kW	kW	A	A	W		kg
3	5.5	12	14.8	46	**ATS 48D17Q**	4.900
4	7.5	17	21	59	**ATS 48D22Q**	4.900
5.5	11	22	28.5	74	**ATS 48D32Q**	4.900
7.5	15	32	35	99	**ATS 48D38Q**	4.900
9	18.5	38	42	116	**ATS 48D47Q**	4.900
11	22	47	57	153	**ATS 48D62Q**	8.300
15	30	62	69	201	**ATS 48D75Q**	8.300
18.5	37	75	81	245	**ATS 48D88Q**	8.300
22	45	88	100	252	**ATS 48C11Q**	8.300
30	55	110	131	306	**ATS 48C14Q**	12.400
37	75	140	162	391	**ATS 48C17Q**	12.400
45	90	170	195	468	**ATS 48C21Q**	18.200
55	110	210	233	580	**ATS 48C25Q**	18.200
75	132	250	285	695	**ATS 48C32Q**	18.200
90	160	320	388	1017	**ATS 48C41Q**	51.400
110	220	410	437	1172	**ATS 48C48Q**	51.400
132	250	480	560	1386	**ATS 48C59Q**	51.400
160	315	590	605	1731	**ATS 48C66Q**	51.400
–	355	660	675	2073	**ATS 48C79Q**	115.000
220	400	790	855	2225	**ATS 48M10Q**	115.000
250	500	1000	1045	2865	**ATS 48M12Q**	115.000

(1) Value indicated on the motor rating plate
(2) Corresponds to the maximum permanent current in class 10. IcL corresponds to the starter rating.
(3) Corresponds to the maximum permanent current in class 20.
(4) The factory setting current corresponds to the value of the nominal current of a standard 4-pole, 400 V, class 10 motor (standard application). Adjust the settings in accordance with the motor nominal current.

Presentation: pages 2 and 3
Characteristics: pages 4 to 7
Dimensions: pages 20 and 21
Schemes: pages 24 to 29

Soft starters

Altistart 48 soft start - soft stop units
Line voltage 208/690 V
Motor power in HP

106762

ATS 48D17Y

106761

ATS 48C14Y

106758

ATS 48M12Y

For standard applications

Motor				Starter 208/690 V - 50/60 Hz				
Motor power *(1)*				Nominal current (IcL) *(2)*	Factory setting current *(4)*	Power dissipated at nominal load	Reference	Weight
208 V	230 V	460 V	575 V					
HP	*HP*	*HP*	*HP*	A	A	W		kg
3	*5*	*10*	*15*	17	14	59	**ATS 48D17Y**	4.900
5	*7.5*	*15*	*20*	22	21	74	**ATS 48D22Y**	4.900
7.5	*10*	*20*	*25*	32	27	104	**ATS 48D32Y**	4.900
10	*–*	*25*	*30*	38	34	116	**ATS 48D38Y**	4.900
–	*15*	*30*	*40*	47	40	142	**ATS 48D47Y**	4.900
15	*20*	*40*	*50*	62	52	201	**ATS 48D62Y**	8.300
20	*25*	*50*	*60*	75	65	245	**ATS 48D75Y**	8.300
25	*30*	*60*	*75*	88	77	290	**ATS 48D88Y**	8.300
30	*40*	*75*	*100*	110	96	322	**ATS 48C11Y**	8.300
40	*50*	*100*	*125*	140	124	391	**ATS 48C14Y**	12.400
50	*60*	*125*	*150*	170	156	479	**ATS 48C17Y**	12.400
60	*75*	*150*	*200*	210	180	580	**ATS 48C21Y**	18.200
75	*100*	*200*	*250*	250	240	695	**ATS 48C25Y**	18.200
100	*125*	*250*	*300*	320	302	902	**ATS 48C32Y**	18.200
125	*150*	*300*	*350*	410	361	1339	**ATS 48C41Y**	51.400
150	*–*	*350*	*400*	480	414	1386	**ATS 48C48Y**	51.400
–	*200*	*400*	*500*	590	477	1731	**ATS 48C59Y**	51.400
200	*250*	*500*	*600*	660	590	1958	**ATS 48C66Y**	51.400
250	*300*	*600*	*800*	790	720	2537	**ATS 48C79Y**	115.000
350	*350*	*800*	*1000*	1000	954	2865	**ATS 48M10Y**	115.000
400	*450*	*1000*	*1200*	1200	1170	3497	**ATS 48M12Y**	115.000

For severe applications

Motor				Starter 208/690 V - 50/60 Hz				
Motor power *(1)*				Nominal current *(3)*	Factory setting current *(4)*	Power dissipated at nominal load	Reference	Weight
208 V	230 V	460 V	575 V					
HP	*HP*	*HP*	*HP*	A	A	W		kg
2	*3*	*7.5*	*10*	12	14	46	**ATS 48D17Y**	4.900
3	*5*	*10*	*15*	17	21	59	**ATS 48D22Y**	4.900
5	*7.5*	*15*	*20*	22	27	74	**ATS 48D32Y**	4.900
7.5	*10*	*20*	*25*	32	34	99	**ATS 48D38Y**	4.900
10	*–*	*25*	*30*	38	40	116	**ATS 48D47Y**	4.900
–	*15*	*30*	*40*	47	52	153	**ATS 48D62Y**	8.300
15	*20*	*40*	*50*	62	65	201	**ATS 48D75Y**	8.300
20	*25*	*50*	*60*	75	77	245	**ATS 48D88Y**	8.300
25	*30*	*60*	*75*	88	96	252	**ATS 48C11Y**	8.300
30	*40*	*75*	*100*	110	124	306	**ATS 48C14Y**	12.400
40	*50*	*100*	*125*	140	156	391	**ATS 48C17Y**	12.400
50	*60*	*125*	*150*	170	180	468	**ATS 48C21Y**	18.200
60	*75*	*150*	*200*	210	240	580	**ATS 48C25Y**	18.200
75	*100*	*200*	*250*	250	302	695	**ATS 48C32Y**	18.200
100	*125*	*250*	*300*	320	361	1017	**ATS 48C41Y**	51.400
125	*150*	*300*	*350*	410	414	1172	**ATS 48C48Y**	51.400
150	*–*	*350*	*400*	480	477	1386	**ATS 48C59Y**	51.400
–	*200*	*400*	*500*	590	590	1731	**ATS 48C66Y**	51.400
200	*250*	*500*	*600*	660	720	2073	**ATS 48C79Y**	115.000
250	*300*	*600*	*800*	790	954	2225	**ATS 48M10Y**	115.000
350	*350*	*800*	*1000*	1000	1170	2865	**ATS 48M12Y**	115.000

(1) Value indicated on the motor rating plate
(2) Corresponds to the maximum permanent current in class 10. IcL corresponds to the starter rating.
(3) Corresponds to the maximum permanent current in class 20.
(4) The factory setting current corresponds to the value of the nominal current of a standard motor according to NEC, 460 V, class 10 (standard application). Adjust the settings in accordance with the motor nominal current.

Presentation: pages 2 and 3
Characteristics: pages 4 to 7
Dimensions: pages 20 and 21
Schemes: pages 24 to 29

Soft starters

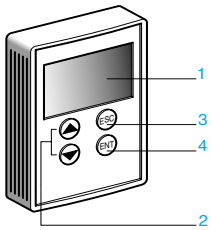
Altistart 48 soft start - soft stop units

Options: Remote terminal, line chokes, protective covers, documentation

VW3 G48101

Remote terminal

The terminal can be mounted on the door of a wall-fixing or floor-standing enclosure. It has the same signalling display and configuration buttons as the terminal integrated in the starter. A switch to lock access to the menu is located at the rear of the terminal.
The option comprises:
- the remote terminal
- a mounting kit containing a cover, screws and an IP 54 seal on the front panel
- a 3 m connecting cable with a 9-way SUB-D connector for connecting to the terminal and an RJ45 connector for connecting to the Altistart 48



1 Information is displayed in the form of codes or values in three "7-segment" displays
2 Buttons for scrolling through the menus or modifying values
3 "ESC": Button for exiting the menus (cannot be used for validation purposes)
4 "ENT": Validation button for entering a menu or confirming the new value selected

Reference

Description	Reference	Weight kg
Remote terminal	VW3 G48101	0.200

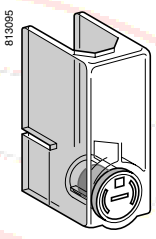
Line chokes

The use of line chokes is recommended in particular when installing several electronic starters on the same line supply. The values of the chokes are defined for a voltage drop between 3% and 5% of the nominal line voltage.
Install the line choke between the line contactor and the starter.

References

For starters	Value of the choke	Nominal current	Degree of protection	Reference	Weight
	mH	A			kg
ATS 48D17●	1.7	15	IP 20	VZ1 L015UM17T	2.100
ATS 48D22●	0.8	30	IP 20	VZ1 L030U800T	4.100
ATS 48D32● and 48D38●	0.6	40	IP 20	VZ1 L040U600T	5.100
ATS 48D47● and 48D62●	0.35	70	IP 20	VZ1 L070U350T	8.000
ATS 48D75● to 48C14●	0.17	150	IP 00	VZ1 L150U170T	14.900
ATS 48C17● to 48C25●	0.1	250	IP 00	VZ1 L250U100T	24.300
ATS 48C32●	0.075	325	IP 00	VZ1 L325U075T	28.900
ATS 48C41● and 48C48●	0.045	530	IP 00	VZ1 L530U045T	37.000
ATS 48C59● to 48M10●	0.024	1025	IP 00	VZ1 LM10U024T	66.000
ATS 48M12●	0.016	1435	IP 00	VZ1 LM14U016T	80.000

Note: *Line chokes with IP 00 degree of protection must be fitted with a protective bar to protect personnel against electrical contact.*



LA9 F702

Protective covers for power terminals

To be used with tags closed

References

For starters	Number of covers per set	Reference	Weight kg
ATS 48C14● and ATS 48C17●	6 *(1)*	LA9 F702	0.250
ATS 48C21●, ATS 48C25● and ATS 48C32●	6 *(1)*	LA9 F703	0.250

(1) The starters have 9 unprotected power terminals.

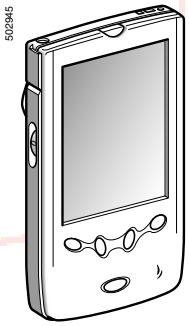
Note:

Documentation

Description	Format	Reference	Weight kg
Altistart 48 user's manual	A5	VVD ED 301066	0.150
Modbus user's manual	A5	VVD ED 302023	0.150
Ethernet, FIPIO, DeviceNet, Profibus DP user's manuals	CD-ROM	DCI CD 398111	0.150

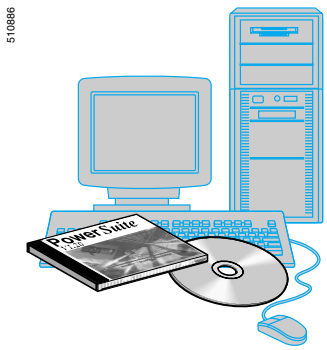
PowerSuite advanced dialogue solutions

The PowerSuite advanced dialogue solutions can be used for Schneider Electric drives and starters. They enable communication with the product from a Pocket PC, a PC or a dedicated terminal.
The solutions, with a Pocket PC or PC, enable files to be prepared for uploading to the drives and the starters. The PowerSuite software creates its files ensuring consistency between the configuration/adjustment functions of the product.



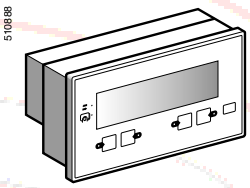
PowerSuite Pocket PC

The Pocket PC can be used during preparation, programming, setup and maintenance.
It comprises a Palm size PC terminal and corresponding connection accessories.
The software is integrated into a Windows CE environment, for which the operating system language can be selected on ordering (English, French, German, Spanish, Italian).
The software incorporates all the functions of integrated and remote terminals (drive or starter configuration and adjustment, control, signalling, etc).
The Pocket PC can be used:
- alone to prepare and store configuration/adjustment files (integral battery or line supply)
- connected to a PC for uploading configuration/adjustment files from the Pocket PC to the PC or downloading from the PC to the Pocket PC
- connected to the drive or to the starter for configuration, adjustment or control purposes or to upload a configuration/adjustment file from the Pocket PC to the product or download a configuration/adjustment file from the product to the Pocket PC



PowerSuite software workshop for PC

The PowerSuite software workshop is used to set up a drive or a starter from a PC in a Microsoft Windows 95, 98, NT4 or 2000 environment.
The software incorporates all the functions of integrated and remote terminals (drive or starter configuration and adjustment, control, signalling, etc.) with assisted, guided operator dialogue in 5 languages (English, French, German, Spanish, Italian) in a Windows environment.
It can be used:
- alone to prepare and store drive or starter configuration files on diskette, CD-ROM or hard disk
The drive or starter configuration can be printed out on paper or can be exported to office automation software.
- connected to the drive or starter for configuration, adjustment or control purposes, or for uploading a configuration/adjustment file from the PC to the product or downloading from the product to the PC.
Connection is via a link between the drive or starter connector and the serial port on the PC.



Magelis display unit with matrix screen

The Magelis display unit with matrix screen can be used to monitor, diagnose and adjust up to 8 Altivar 28, 58 or 58F drives in 5 languages (English, French, German, Spanish, Italian).
It can display variables in alphanumeric format with European, Cyrillic or Asian fonts in 4 sizes, or it can display icons or background images in black and white as well as animations in barchart or gauge format.
The application is preloaded in the factory.

PowerSuite advanced dialogue solutions

VW3 A8103●●

Pocket PC

Several solutions are available to meet the needs of individual users:
- The complete Pocket PC
- The setup kit
- The connection kit

The complete Pocket PC is used to set up drives and starters and comprises:
□ 1 Palm size "Jordana 525" PC terminal, with multilingual operating system *(1)*, supplied with PC synchronisation cable and mains power supply
□ 1 CD-ROM containing the multilingual *(1)* setup software which can be ordered separately
□ 1 connection kit for the Palm size PC terminal

The setup kit comprises:
□ 1 CD-ROM containing the multilingual *(1)* setup software which can be ordered separately
□ 1 connection kit for the Palm size PC terminal

The connection kit for the Palm size PC terminal comprises:
-2 connection cables, length 0.6 m, with 2 RJ45 connectors, marked respectively “PowerSuite” and “ATV 28 before 09/01”
- 1 RJ45/9-way SUB-D adaptor for connecting ATV 58 and ATV 58F drives
- 1 converter marked “RS 232/RS 485 PPC” with one 9-way male SUB-D connector and 1 RJ45 connector

Description	Used with	Reference	Weight kg
Complete Pocket PC	ATS 48, ATV 28 ATV 58 and ATV 58F	**VW3 A8108●●** *(2)*	1.000
Setup kit	ATS 48, ATV 28 ATV 58 and ATV 58F	**VW3 A8102**	0.400
Connection kit for the Palm size PC terminal	ATS 48, ATV 28 ATV 58 and ATV 58F	**VW3 A8111**	0.300

PowerSuite software workshop for PC

The software workshop is used to set up the drives and starters from a PC.
It comprises:
- 1 CD-ROM containing the multilingual *(1)* setup software
- 1 connection kit for PC

The PC connection kit comprises:
-2 connection cables, length 3 m, with 2 RJ45 connectors, marked respectively “PowerSuite” and “ATV 28 before 09/01”
-1 RJ45/9-way SUB-D adaptor for connecting ATV-58 and ATV-58F drives
-1 converter marked “RS 232/RS 485 PC” with one 9-way female SUB-D connector and 1 RJ45 connector

Description	Used with	Reference	Weight kg
1 CD-ROM containing the multilingual *(1)* setup software	ATS 48, ATV 28 ATV 58, ATV 58F	**VW3 A8104**	0.100
Connection kit for PC	ATS 48, ATV 28 ATV 58, ATV 58F	**VW3 A8106**	0.350

XBT HM017010A8

Magelis display unit with matrix screen

The terminal has a backlit LCD with 8 lines of 40 characters.
The RS 485 connection kits for ATV 28 (VW3 A28301) and ATV 58 (VW3 A58306) drives, as well as other connection accessories, should be ordered separately according to the number and type of drives connected. Please consult your Regional Sales Office.

Description	Used with	Reference	Weight kg
Magelis display unit with matrix screen	ATV 28, ATV 58 and ATV 58F	**XBT HM017010A8**	0.600

Accessories

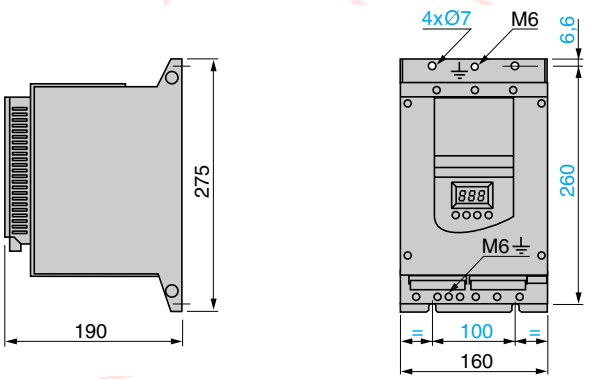
Description	Used with	Reference	Weight kg
1 upgrade CD-ROM for multilingual *(1)* setup software *(3)*	ATS 48, ATV 28 ATV 58 and ATV 58F	**VW3 A8105**	0.100
Palm size “Jordana 525” PC terminal supplied with PC synchronisation cable and mains power supply	ATS 48, ATV 28 ATV 58 and ATV 58F	**VW3 A8103●●** *(2)*	0.300
1 x 16 MB compact flash card containing the Pocket PC software for the Palm size “Jordana 525” *(4)* PC terminal	–	**VW3 A8110**	0.100

(1) English, French, German, Spanish, Italian.
(2) To order the operating system in your chosen language, replace ●● by EN for English, FR for French, DE for German, SP for Spanish and IT for Italian.
(3) To find out about the latest available version, please consult your Regional Sales Office.
(4) This card enables the software to be run immediately without synchronising with a PC.

Soft starters

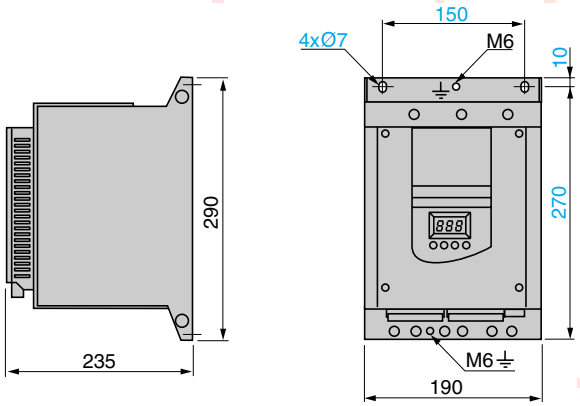
Altistart 48 soft start - soft stop units

ATS 48D17● to ATS 48D47●



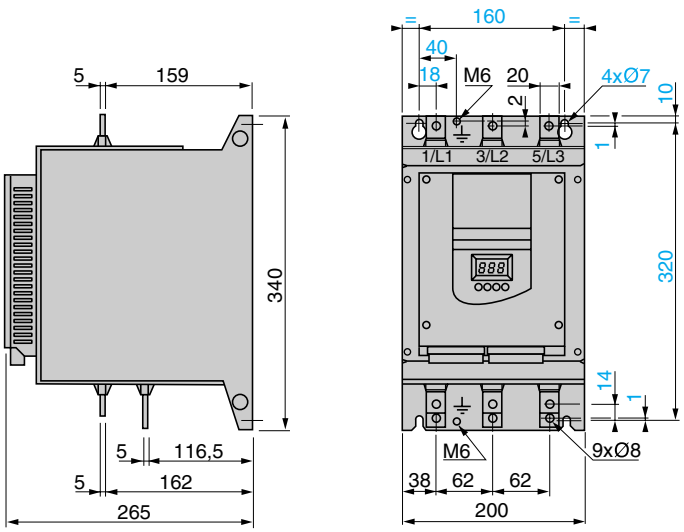
Maximum connection capacity:
Earth connections: 10 mm² (AWG 8)
Power terminals: 16 mm² (AWG 8)

ATS 48D62● to ATS 48C11●



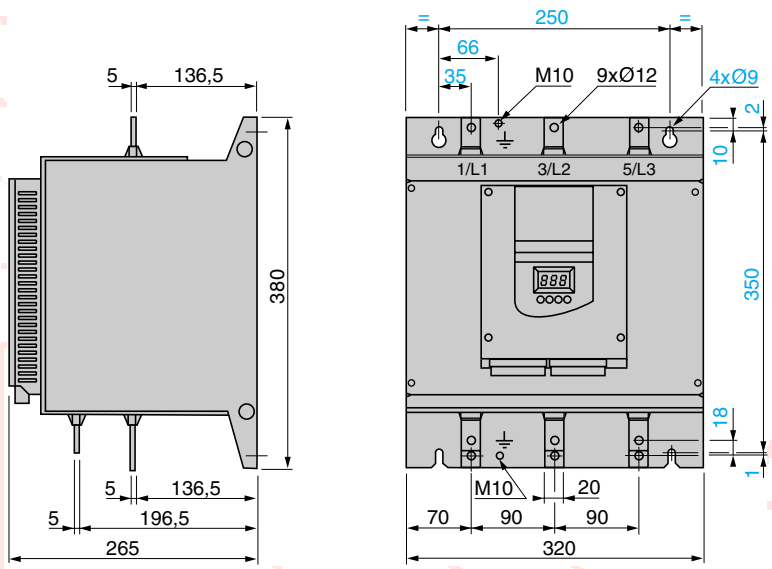
Maximum connection capacity:
Earth connections: 16 mm² (AWG 4)
Power terminals: 50 mm² (AWG 2/0)

ATS 48C14● to ATS 48C17●



Maximum connection capacity:
Earth connections: 120 mm² (busbar)
Power terminals: 95 mm² (AWG 2/0)

ATS 48C21● to ATS 48C32●

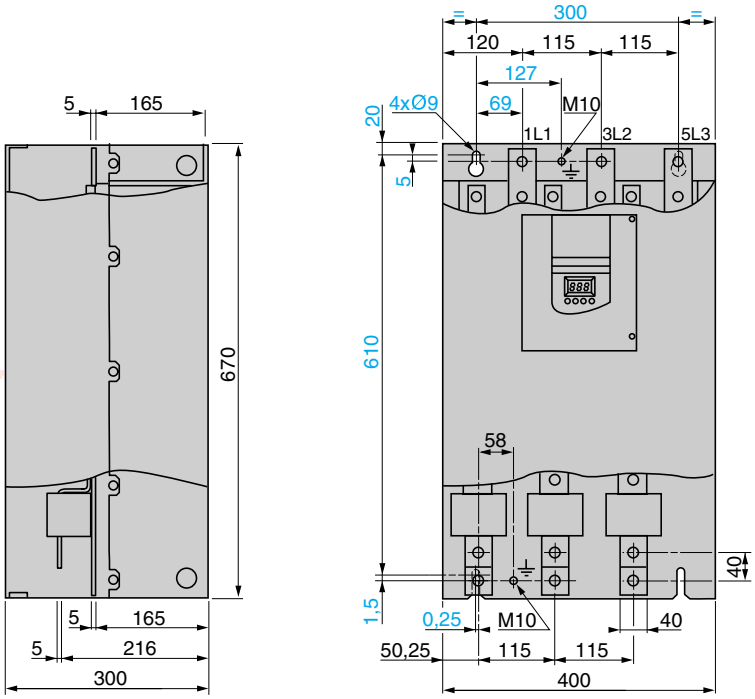


Maximum connection capacity:
Earth connections: 120 mm2 (busbar)
Power terminals: 240 mm2 (busbar)

Presentation: pages 2 and 3
Characteristics: pages 4 and 5
References: pages 12 to 15
Schemes: pages 24 to 29

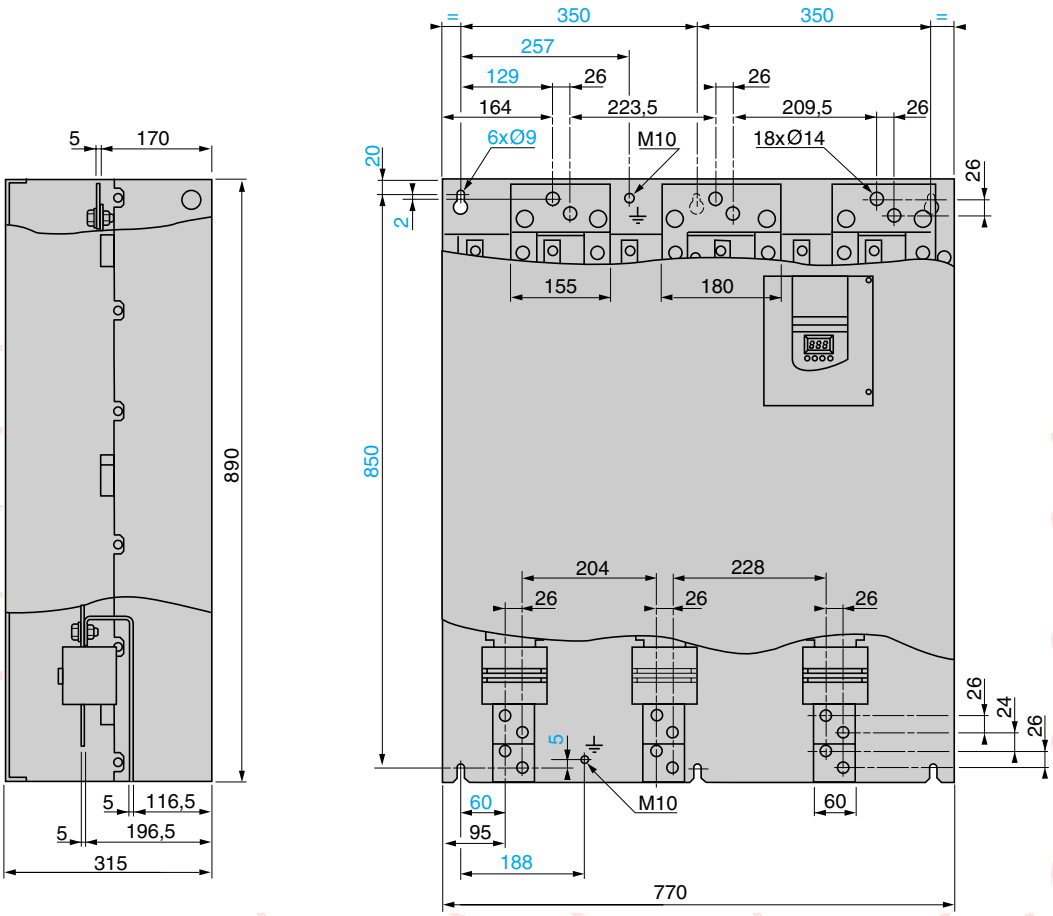
ATS 48C41● to C66●

Maximum connection capacity:
Earth connections:
240 mm² (busbar)
Power terminals:
2 x 240 mm² (busbar)



ATS 48C79● to M12●

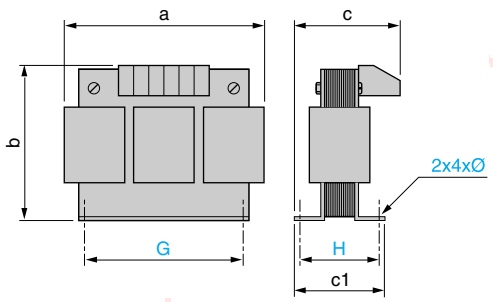
Maximum connection capacity:
Earth connections:
2 x 240 mm² (busbar)
Power terminals:
4 x 240 mm² (busbar)



Presentation: pages 2 and 3
Characteristics: pages 4 and 5
References: pages 12 to 15
Schemes: pages 24 to 29

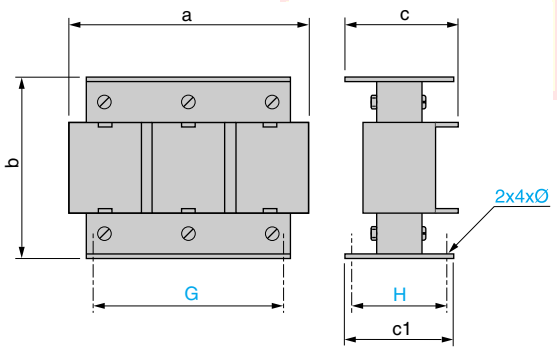
Chokes

VZ1-L015UM17T to L070U350T



VZ1-	a	b	c	c1	G	H	Ø
L015UM17T	120	150	80	75	60/80.5	52	6
L030U800T	150	180	120	100	75/106.5	76	7
L040U600T	180	215	130	100	85/122	76	7
L070U350T	180	215	150	130	85/122	97	7

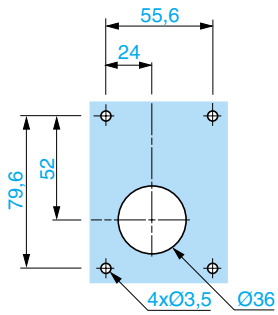
VZ1-L15OU170T to LM14U016T

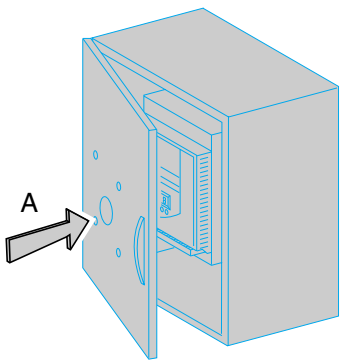


VZ1-	a	b	c	c1	G	H	Ø
L150U170T	270	240	170	140	105/181	96	11.5
L250U100T	270	240	220	160	105/181	125	11.5
L325U075T	270	240	240	175	105/181	138	11.5
L530U045T	380	410	225	140	310	95	9
LM10U024T	400	410	310	170	310	125	9
LM14U016T	420	490	340	170	310	125	9

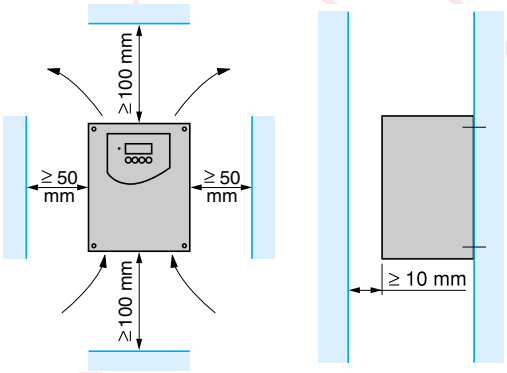
Mounting the remote terminal

VW3 G48101





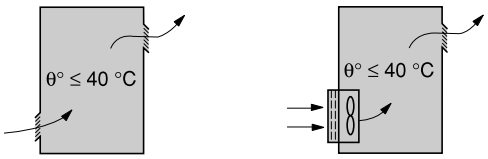
Mounting recommendations



- Install the Altistart vertically, at ± 10°.
- Do not place the Altistart close to or above heating elements.
- Leave sufficient free space to ensure that the air required for cooling purposes can circulate from the bottom to the top of the unit.

Caution: The IP 00 version of the Altistart 48 must be fitted with a protective bar to protect personnel against electrical contact.
Protective covers are available for the ATS 48C14● to ATS 48C32●. They should be ordered separately.

Mounting in a metal wall-fixing or floor-standing enclosure with degree of protection IP 23 or IP 54



- Observe the mounting recommendations above.
- To ensure proper air circulation in the starter:
  - ☐ Fit ventilation grilles
  - ☐ Ensure that there is sufficient ventilation. If there is not, install forced ventilation with a filter. The openings and/or fans must provide a flow rate at least equal to that of the starter fans (see the table below)
- Use special filters with IP 54 protection.

Fan flow rate depending on the starter rating

ATS 48 starter	Flow rate m^3/hour
ATS48 D32● and D38●	14
ATS48 D47●	28
ATS48 D62● to C11●	86
ATS48 C14● and C17●	138
ATS48 C21● to C32●	280
ATS48 C41● to C66●	600
ATS48 C29● to M12●	1200

Metal wall-fixing or floor-standing enclosure with IP 54 degree of protection
For non-ventilated Altistart units (ATS 48D17● and 48D22●), install a fan ⩽ 50 mm below the starter to circulate the air inside the enclosure in order to avoid hot spots.

Calculating the size of the enclosure

Maximum thermal resistance Rth (°C/W)

$$Rth = \frac{\theta - \theta e}{P}$$

θ = maximum temperature inside enclosure in °C
θe = maximum external temperature in °C
P = total power dissipated in the enclosure in W

The starter/motor combinations on pages 12 and 13 can only be used in ambient temperatures ⩽ 40°C.
For temperatures between 40°C and 60°C, derate the maximum permanent current of the starter by 2% for every degree above 40°C.
Power dissipated by the starter: see pages 12 and 13.
If the starts are infrequent, it is advisable to bypass the Altistart at the end of starting in order to reduce heat dissipation.
The power dissipated will then be between 15 and 30 W.
Add the power dissipated by the other equipment components.

Effective exchange surface area of enclosure S (m^2)

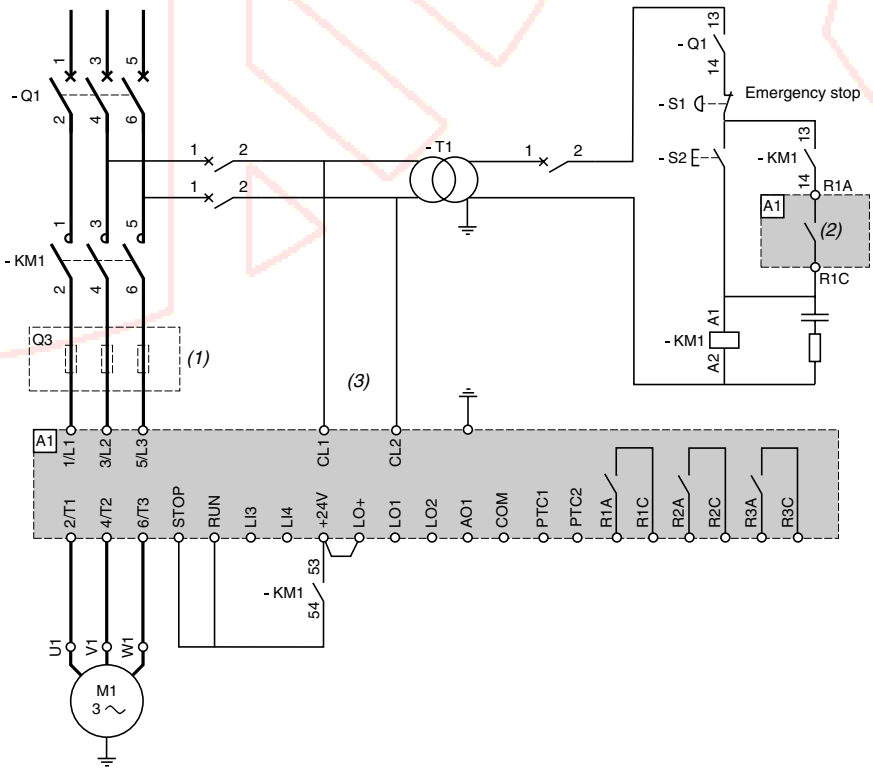
(sides + top + front panel if wall-mounted)

$$S = \frac{K}{Rth}$$

K is the thermal resistance per m^2 of casing

For ACM type metal enclosures: K = 0.12 with internal fan, K = 0.15 without fan
Caution: Do not use insulated enclosures as they have a poor level of conductivity.

Recommended application diagram for non-reversing unit with line contactor, type 1 and type 2 coordination



Select the components to connect, according to the descriptions on page 25, from the association tables on pages 30 to 39.

(1) For type 2 coordination (according to IEC 60947-4-2), install fast-acting fuses to ensure that the starter will be protected in the event of a short-circuit.

(2) Assign relay R1 as the "isolating relay". Beware of the operating limits of the contacts (see Characteristics page 4), for example when connecting to high rating contactors.

(3) Insert a transformer if the line voltage is different to that defined for the control circuit (see page 4).

Types of coordination

The standard defines tests for different current levels which are designed to expose the device to extreme conditions.
Based on the state of the components after a short-circuit test, the standard defines 2 types of coordination.

- Type 1 coordination: Damage to the contactor and the starter is acceptable under 2 conditions:
  - No risk is posed to the operator
  - Elements other than the contactor and the starter are not damaged

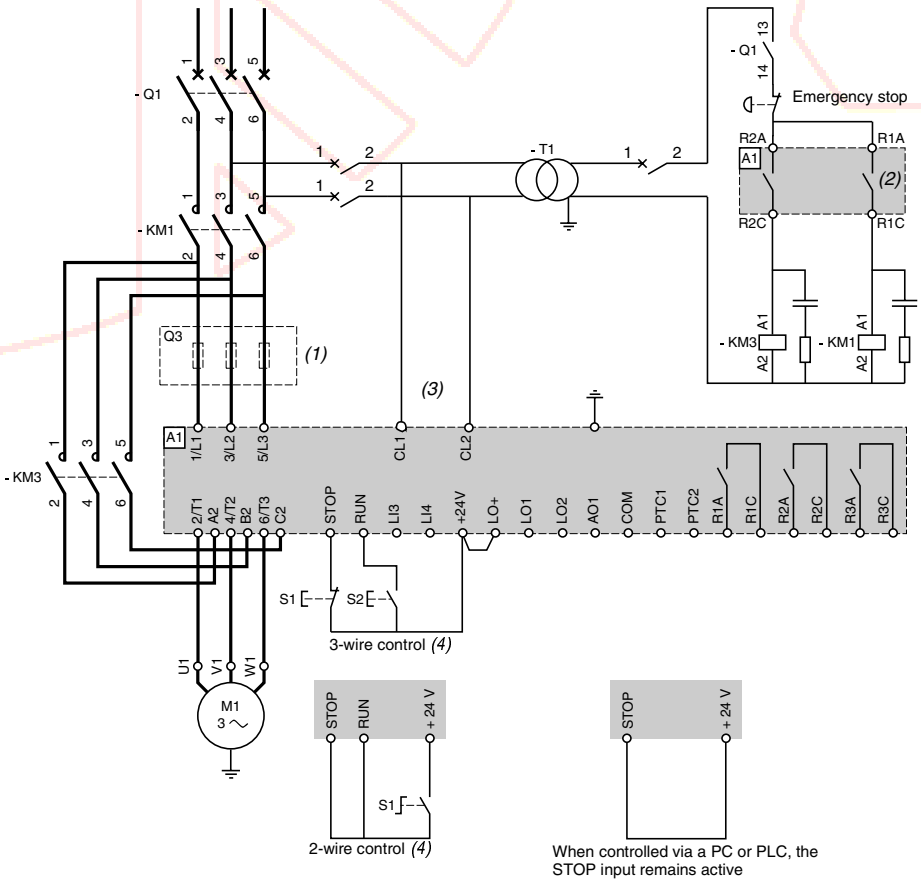
Maintenance must be carried out after a short-circuit.

- Type 2 coordination: Minor soldering of the contactor contacts is permissible if they can be separated easily. The starter must not be damaged beyond repair.

The protection and control devices remain operational after type 2 coordination tests.
Once the fuses have been replaced, check the contactor.

Note: *The starter will protect the motor and the cables against overloads. If this protection function is disabled, external thermal protection must be provided.*

Recommended application diagram for non-reversing unit with starter line and bypass contactors, type 1 and type 2 coordination



Select the components to connect, according to the descriptions below, from the association tables on pages 30 to 39.

(1) For type 2 coordination (according to IEC 60947-4-2), install fast-acting fuses to ensure that the starter will be protected in the event of a short-circuit.

(2) Assign relay R1 as the "isolating relay". Beware of the operating limits of the contacts (see Characteristics page 4), for example when connecting to high rating contactors.

(3) Insert a transformer if the line voltage is different to that defined for the control circuit (see page 4).

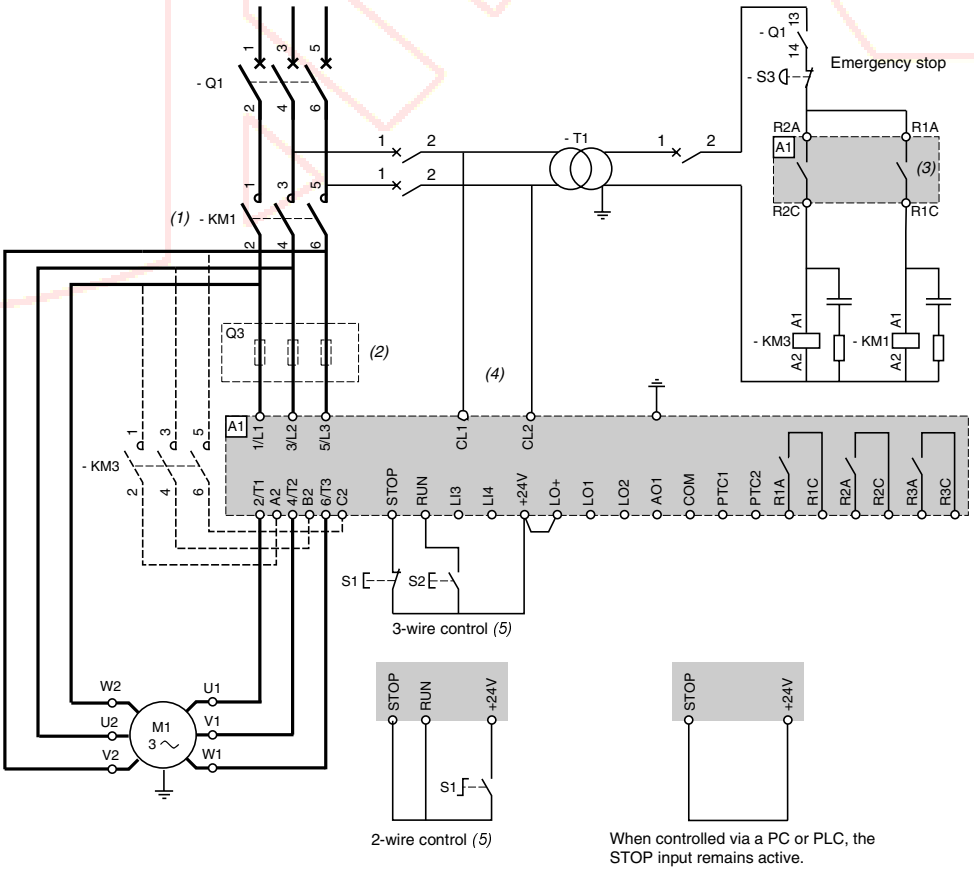
(4) 2-wire and 3-wire control (see page 46).

Components to connect depending on the types of coordination and voltages

Designation	Description
M1	Motor
A1	Starter (standard applications and severe applications)
Q1	Circuit-breaker or switch/fuses
Q3	3 FA fuses
KM1, KM3	Contactor
S1, S2	Control (separate parts XB2 or XB2 M)

Recommended application diagram for connection to the motor delta terminals, non-reversing, freewheel stop, with starter line and bypass contactors, type 1 and type 2 coordination

This type of wiring enables the starter rating to be reduced.
ATS 48●●●Q



Select the components to connect according to the descriptions on page 27 and the association tables on pages 30 to 39.

(1) A line contactor must be used in the sequence.

(2) For type 2 coordination (according to IEC 60947-4-2), install fast-acting fuses to ensure that the starter will be protected in the event of a short-circuit.

(3) R1 must be assigned as the "isolating relay" to control contactor KM1. Beware of the operating limits of the contacts. (see Characteristics page 4), for example when connecting to high rating contactors.

(4) Insert a transformer if the line voltage is different to that defined for the control circuit (see page 4)

(5) 2-wire and 3-wire control (see page 46).

Types of coordination
The standard defines tests for different current levels which are designed to expose the device to extreme conditions.
Based on the state of the components after a short-circuit test, the standard defines 2 types of coordination.

- Type 1 coordination: damage to the contactor and the starter is acceptable under 2 conditions:
  - No risk is posed to the operator
  - Elements other than the contactor and the starter are not damaged

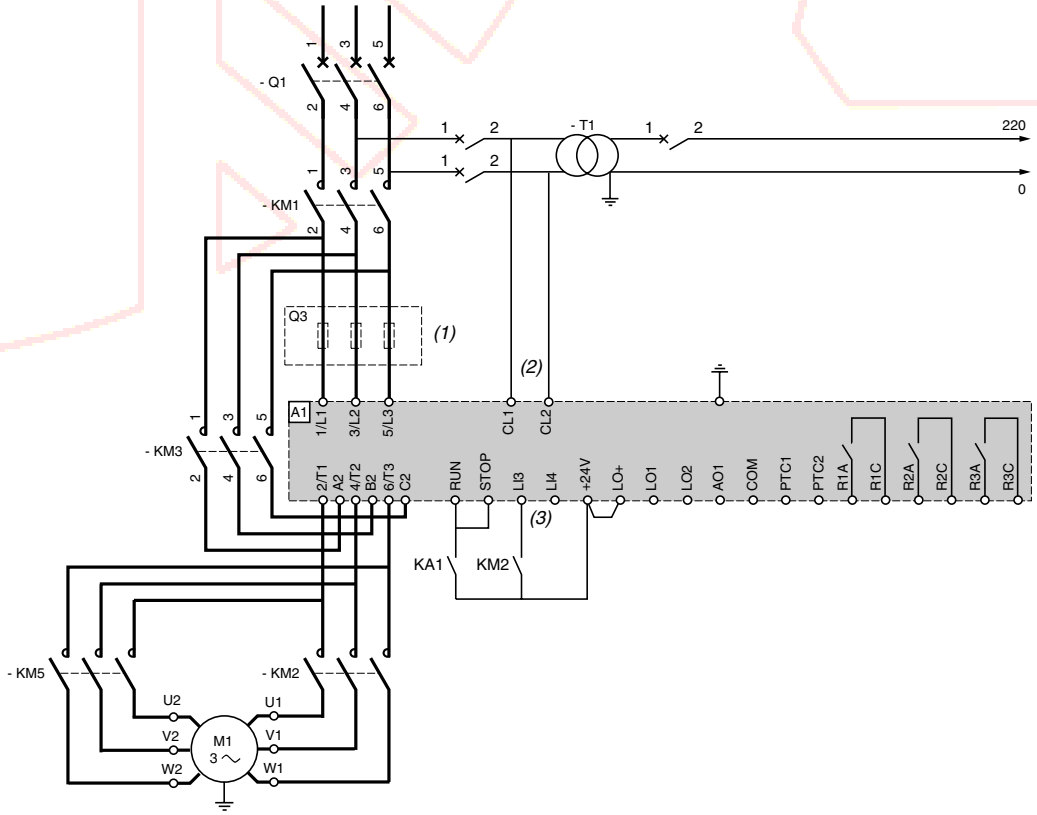
Maintenance must be carried out after a short-circuit.

- Type 2 coordination: Minor soldering of the contactor contacts is permissible if they can be separated easily. The starter must not be damaged beyond repair.

The protection and control devices remain operational after type 2 coordination tests.
Once the fuses have been replaced, check the contactor.

Note: *The starter will protect the motor and the cables against overloads. If this protection function is disabled, external thermal protection must be provided.*

Recommended application diagram for LSP/HSP motor, non-reversing with starter line and bypass contactors



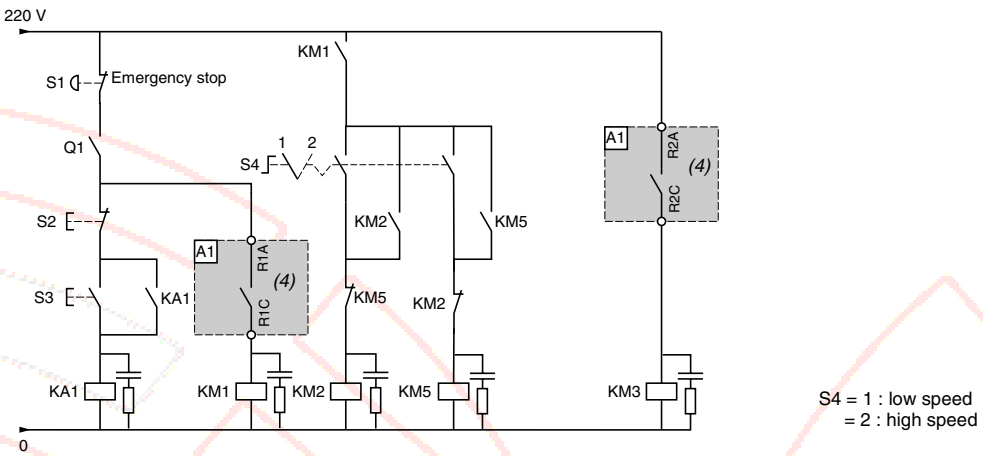
Select the components to connect, according to the descriptions below, from the association tables on pages 30 to 39.

(1) For type 2 coordination (according to IEC 60947-4-2), install fast-acting fuses to ensure that the starter will be protected in the event of a short-circuit.

(2) Insert a transformer if the line voltage is different to that defined for the control circuit (see page 4).

(3) Assign logic input LI3 to "activate the adjustment functions of the 2nd motor".

(4) Assign relay R1 as the "isolating relay". Beware of the operating limits of the contacts (see Characteristics page 4), for example when connecting to high rating contactors.



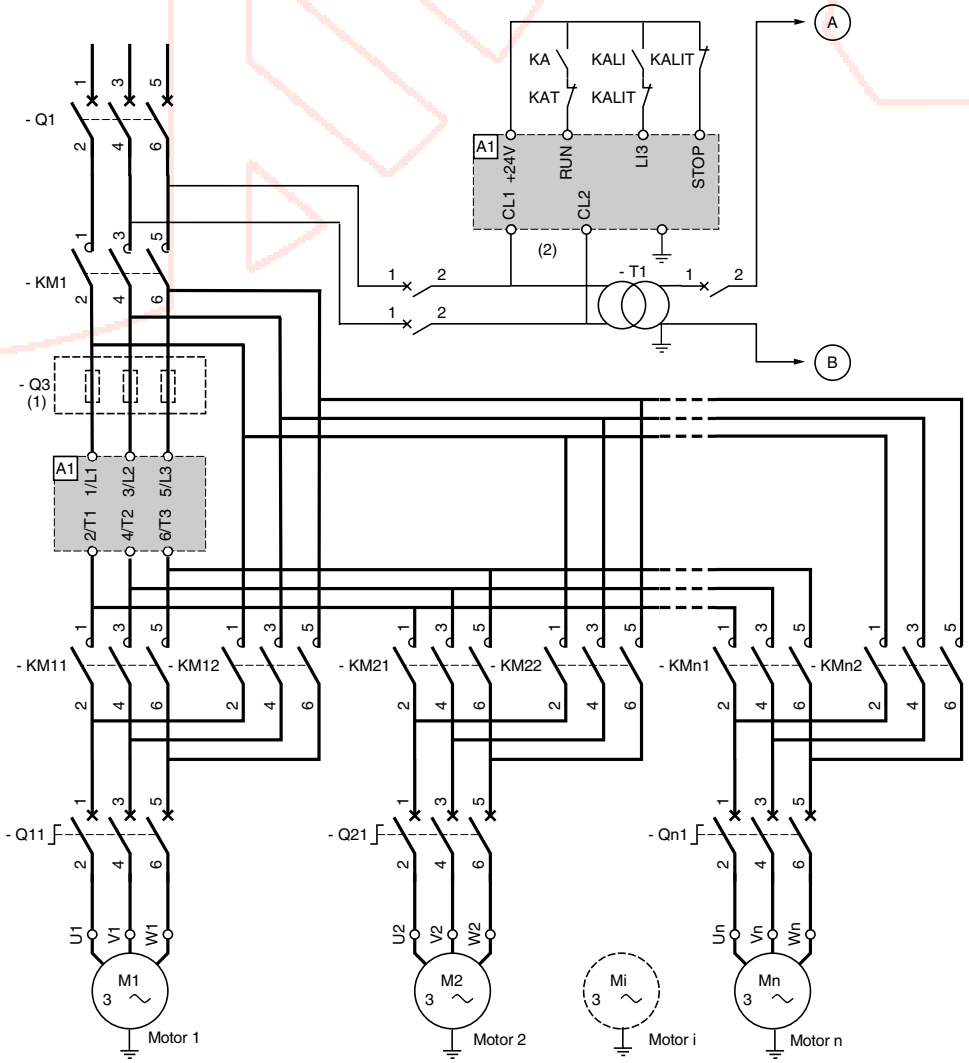
S4 = 1 : low speed
= 2 : high speed

Components to connect depending on the types of coordination and voltages

Designation	Description
M1	Motor
A1	Starter (standard applications and severe applications)
Q1	Circuit-breaker or switch/fuses
Q3	3 FA fuses
KM1, KM2, KM3, KM5, KA1	Contactors and relays
S1, S2, S3	Control (separate parts XB2 or XB2 M)

Recommended application diagram for starting and decelerating several motors cascaded with a single Altistart 48, non-reversing and line contactor

The diagram is given as an example only. For more details, refer to the Altistart 48 user's manual.



Select the components to connect, according to the designations below, from the association tables on pages 30 to 39.

(1) For type 2 coordination (according to IEC 60947-4-2), install fast-acting fuses to ensure that the starter will be protected in the event of a short-circuit.

(2) Insert a transformer if the line voltage is different to that defined for the control circuit (see page 4).

Important:

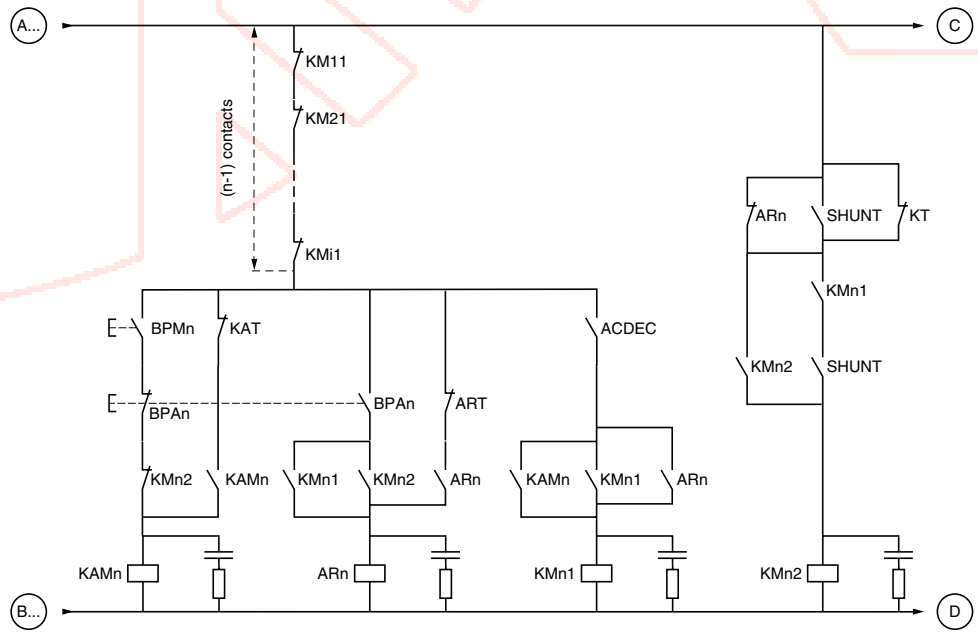
- One Altistart 48 logic input must be configured as a "cascading" input.
- In the event of a fault, it will not be possible to decelerate or brake any motors that may be running at that time.
- Adjust the thermal protection of each circuit-breaker Q_{n1} for the corresponding nominal motor current.

Components to connect depending on the types of coordination and voltages

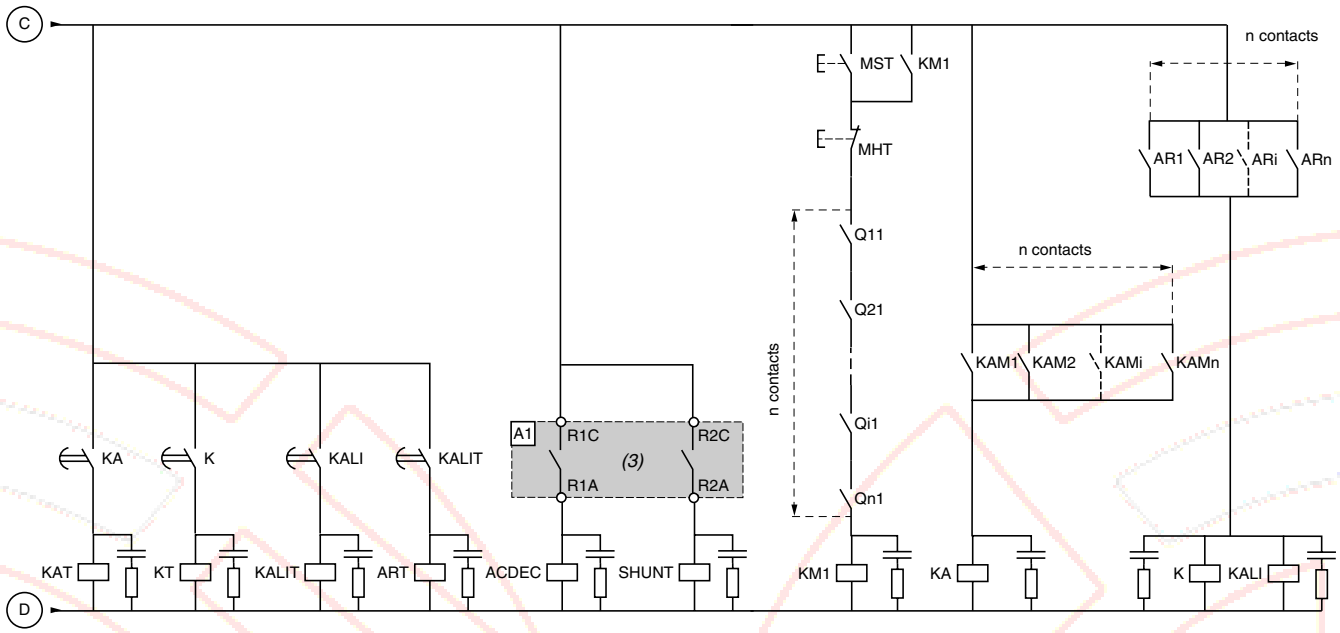
Designation	Description
M1, M2, Mi, Mn	Motor
A1	Starter (standard applications and severe applications)
KM1, KM2, ..., KMi, KMn	Contactor
Q1	Circuit-breaker or switch/fuses
Q3	3 FA fuses
Q11, Q21, ..., Qn1	Thermal magnetic circuit-breakers
KA, KAT, KALI, KALIT	Control (separate parts XB2 or XB2 M)

Recommended application diagram for starting and decelerating several motors cascaded with a single Altistart 48, non-reversing and line contactor (continued)

Motor n control



Cascade control



(3) Assign relay R1 as the "isolating relay". Beware of the operating limits of the contacts (see Characteristics page 4), for example when connecting to high rating contactors.

BPMn: "Run" button motor n
BPAn: "Stop" button motor n
MST: General "Run" button
MHT: General "Stop" button

Presentation: pages 2 and 3
Characteristics: pages 4 to 7
References: pages12 to 15
Dimensions: pages 20 to 23

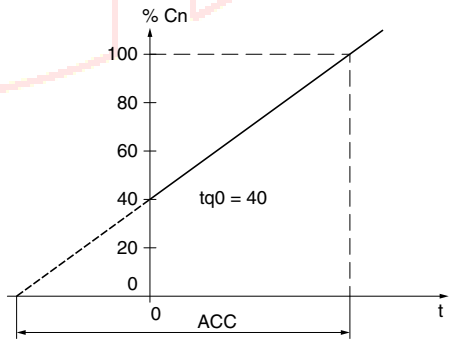
Adjustment functions

■ **Nominal motor current** (maximum permanent current)
The nominal current of the starter can be adapted to the nominal motor current indicated on the rating plate.
Adjustment range: 0.4 to 1.3 times the starter nominal current.

■ **Limiting current**
The maximum starting current can be adjusted.
Adjustment range: 150% to 700% of the nominal motor current set and limited to 500% of the maximum permanent current defined for the starter rating.

■ **Acceleration ramp time**
During the starting phase, the Altistart 48 applies a torque ramp to the motor. The time (ACC) set corresponds to the time taken by the ramp to reach the nominal torque (starting at 0). Adjustment range: 1 to 60 s.

■ **Initial starting torque**
The initial torque tq0 applied to the motor can be used to instantly overcome any resistive starting torque. Adjustment range: 0 to 100% of the nominal motor torque.

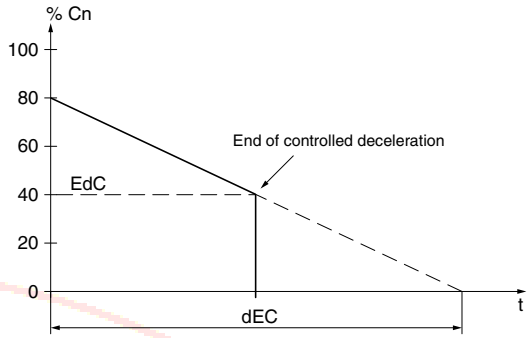


Acceleration ramp during time ACC with initial starting torque Iq0 = 40% of the nominal motor torque

■ **Selection of the type of stop**
Three types of stop are available for selection:

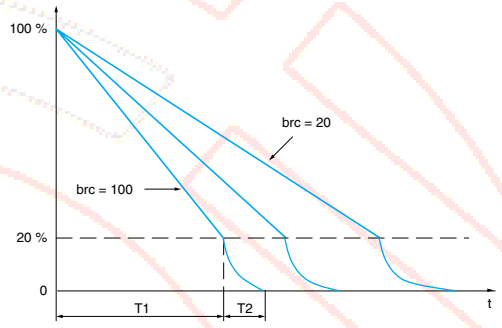
□ **Freewheel motor stop**

□ **Motor stop by deceleration via torque control (pump application)** This type of stop enables a centrifugal pump to be decelerated gradually on a ramp in order to avoid a sudden stop. It can be used to dampen the hydraulic transient in order to significantly reduce pressure surges.
The deceleration ramp time (dEC) can be adjusted.
During deceleration, the pump flow rate decreases and becomes negligible at a certain speed. To continue to decelerate would serve no purpose. A torque threshold (EdC) can be set at which the motor will change to freewheel stop mode, avoiding the unnecessary heating of the motor and the pump.

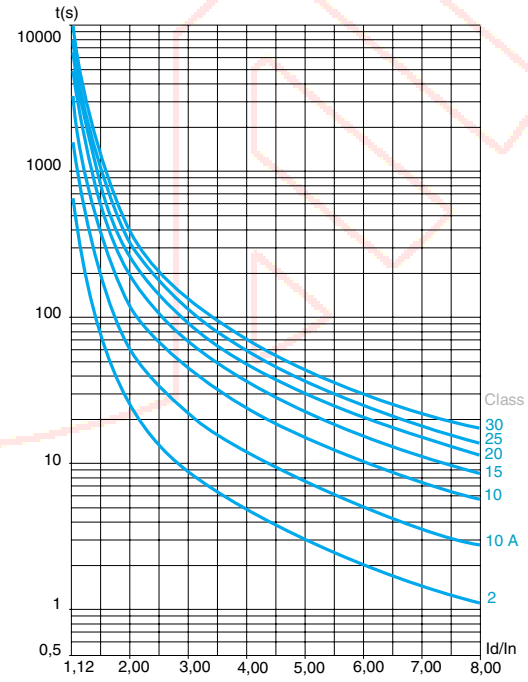


Decelerated stop by torque control during time dEC with threshold Edc for changing to freewheel stop mode Edc = 40% of nominal motor torque

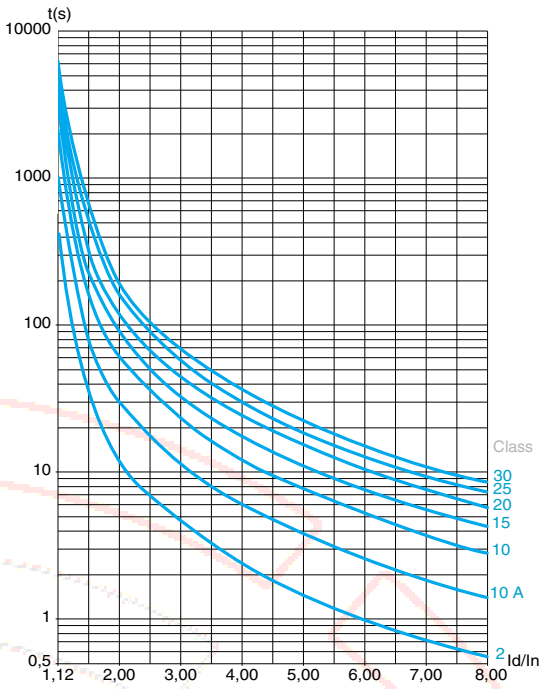
□ **Dynamic braking motor stop (application: stopping high inertia machines)**
This type of stop will decelerate the motor if there is considerable inertia.
The braking torque level (brc) can be adjusted. The dynamic braking time (T1) corresponds to the time taken to decelerate from 100% to 20% of the nominal motor speed. To improve braking at the end of deceleration, the starter injects a d.c. current for an adjustable period of time (T2).



Dynamic braking stops for different braking torque levels brc



Motor thermal protection curves (cold)



Motor thermal protection curves (warm)

Protection functions

The Altistart 48 offers functions for protecting the motor and the machine.

■ Calculated motor thermal protection

The starter continuously calculates the temperature rise of the motor based on the nominal current which has been set and the actual current absorbed. In order to adapt the Altistart to individual motors and applications, several protection classes are offered in accordance with standard IEC 60947-4-2:
class 30, class 25, class 20 (severe application), class 15, class 10 (standard application), class 10 A, sub-class 2.
Different protection classes are defined for the starting capacities of the motor:
- cold start without thermal fault (corresponding to a stabilised motor thermal state, motor switched off)
- warm start without thermal fault (corresponding to a stabilised motor thermal state, at nominal power)

The motor thermal protection function can be disabled.
After the motor has stopped or the starter has been switched off, the thermal state is calculated even if the control circuit is not energised. The Altistart thermal control prevents the motor from restarting if the temperature rise is too high. If special motors are used which do not have thermal protection via curves, provide external thermal protection via probes or thermal overload relays.
The starter is factory-set to protection class 10.
The tripping curves are based on the relationship between the starting current Is and the (adjustable) nominal motor current In.

Trip time (cold)

Trip time for a standard application (class 10)			Trip time for a severe application (class 20)		
Is = 3 In	Is = 4 In	Is = 5 In	Is = 3.5 In	Is = 4 In	Is = 5 In
46 s	23 s	15 s	63 s	48 s	29 s

Trip time (warm)

Trip time for a standard application (class 10)			Trip time for a severe application (class 20)		
Is = 3 In	Is = 4 In	Is = 5 In	Is = 3.5 In	Is = 4 In	Is = 5 In
23 s	12 s	7.5 s	32 s	25 s	15 s

■ Reset motor thermal state

Activating the function resets the motor thermal state calculated by the starter to zero.

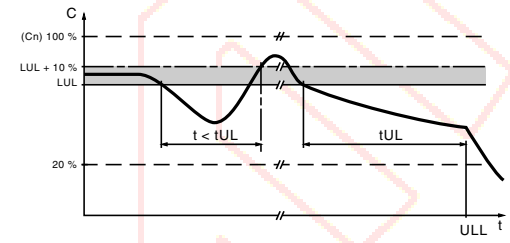
■ Motor thermal protection with PTC probes

The starter integrates the processing of PTC probes, thus avoiding the use of an external device. The "PTC probe thermal overshoot" fault or alarm can be indicated using a configurable logic output or displayed via the serial link. The function can be disabled.
Note: The "PTC probe protection" and "calculated motor thermal protection" functions are independent and can be active simultaneously.

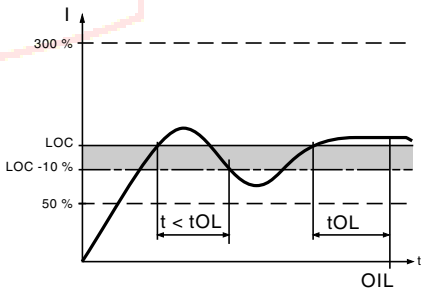
■ **Starter ventilation**: The cooling fan on the starter is switched on as soon as the heatsink temperature reaches 50°C. It is switched off when the temperature returns to 40°C.

■ Starter thermal protection

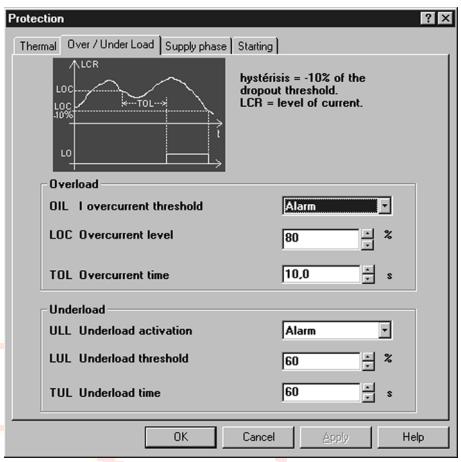
The starter is protected against thermal overloads by an analogue thermal probe.



Motor underload detection (ULL)



Motor overcurrent detection (OIL)



Configuring the starter overload and underload with PowerSuite on a PC

Protection functions (continued)

Motor underload protection

The starter detects a motor underload if the motor torque falls below a preset torque threshold (LUL) for a specific (adjustable) period of time (tUL).
The motor underload threshold can be set between 20% and 100% of the nominal motor torque. The permissible underload duration can be set between 1 and 60 s.
The detection function can trigger an alarm or a fault. The detection function can be disabled. The "motor underload detected" alarm can be indicated by a configurable logic output and/or displayed via the serial link in the state of the starter.
The "motor underload detected" fault (ULF) locks the starter and can be displayed via the serial link.

Excessive acceleration time protection

This protection function can be used to detect a start which takes place in adverse conditions. Examples of such conditions include a locked rotor or a motor unable to reach its nominal rotation speed.
If the start duration is greater than the value set (between 10 and 999 s), the drive changes to fault mode. The function can be disabled.

Current overload protection

The starter detects a current overload if the motor current exceeds a preset overcurrent threshold (LOC) for a specific (adjustable) period of time (tOL).
The overcurrent threshold can be set between 50% and 300% of the nominal motor current.
The permissible overcurrent duration can be set between 0.1 and 60 s.
This function is only active in steady state.
The detection function can trigger an alarm or a fault. It can also be disabled.
The "current overload detected" alarm can be indicated by a configurable logic output and/or displayed via the serial link.
The "current overload detected" fault (OLC) locks the starter and can be displayed via the serial link in the state of the starter.

Protection against line phase inversion

This function can be used to detect the direction of rotation of the motor phases and, if it is enabled, to indicate a fault when the direction of rotation is reversed.

Time before restarting

This function can be used to avoid several consecutive starts which may cause:
- the thermal overheating of the application, which is not permitted
- a thermal fault which will require maintenance work to be carried out
- overcurrents (if the direction of rotation is reversed) or repeats (run/stop commands)

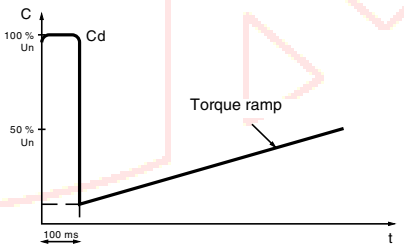
Following a stop command, the motor can only restart once the preset time delay has elapsed.
The motor is restarted once the time delay has elapsed if a run command is still valid or if a new run command is sent.
Adjustment range: 0 to 999 s.

Motor phase loss detection

The function is used to adjust the sensitivity of the protection function in order to detect a loss of current or a low current in one of the three motor phases for at least 0.5 s or in all three motor phases for at least 0.2 s. The value of the minimum current level can be set between 5% and 10% of the starter nominal current.

Automatic restart

After locking on a fault, the function permits up to six restart attempts at intervals of 60 s if the fault has disappeared and the run commands are still present. After the sixth attempt, the starter will remain locked and the fault will have to be reset before a restart is permitted.
If the function is active, the fault relay remains activated if line phase loss, motor phase loss or line frequency out of tolerance faults are detected. This function can only be used in 2-wire control.



Application of a voltage boost equal to 100% of the nominal motor voltage

Advanced adjustment functions

Torque limit

Designed primarily for high inertia and constant torque conveyor applications , the function restricts the torque ramp reference to the preset value.
For example, the function can be used to limit the torque to a constant value throughout the starting period.
Adjustment range: 10% to 200% of the nominal motor torque.

Voltage boost level

The function can be used to avoid any "starting" torque (phenomenon caused by friction on stopping or by mechanical play). When a run command is sent, the starter applies a fixed voltage to the motor for a limited period of time before starting. The function can be disabled.
The voltage setting value varies between 50% and 100% of the nominal motor voltage.

Connecting the starter to the motor delta terminal

ATS48●●●Q starters connected to motors with delta terminals can be wired in series in the motor windings. This type of connection reduces the current in the starter by a ratio of $\sqrt{3}$, which enables a lower rating starter to be used. The nominal current and limiting current settings as well as the current displayed during operation are on-line values and are indicated on the motor. For this application, the braking or decelerating stop functions are inactive. Only freewheel stopping is possible.
The adjustment range of the nominal motor current and the limiting current are multiplied by $\sqrt{3}$ if the function is selected.
This function is not compatible with the following functions: motor phase loss detection, motor preheating, cascade, decelerated stop and dynamic braking.
Use the scheme recommended on page 26 for this type of configuration.

Test on low power motor

This function can be used to test a starter on a motor whose power is very much lower that of the starter. It can be used for example to check the electrical wiring of a device.
The function is automatically cancelled when the starter is switched off.
The next time the starter is switched on, the starter returns to its initial configuration.

Activation of the cascade function

This function can be used to start and decelerate several cascaded motors with a single starter.
In order to gain maximum benefit from torque control, it is advisable to use motors with powers between 0.5 and 1 times the power of the motor.
The wiring diagram for the cascaded motor function is shown on page 28.
This function is not compatible with the following functions: motor preheating and connection to the motor delta terminal.

Line frequency

The following frequencies can be selected for the function:
- 50 Hz. The frequency fault monitoring tolerance is ± 20%.
- 60 Hz. The frequency fault monitoring tolerance is ± 20%.
- Automatic detection of the line frequency by the starter The frequency fault monitoring tolerance is ± 6%.

□ 50 Hz and 60 Hz are recommended if the power supply is provided by a generating set, given their high tolerance.

Reset kWh or the operating time

Sets the value of the power in kW/h or the operating time value to 0. The calculation of the values is updated once the reset command has been sent.

Return to factory settings

The function can be used to reset each setting to its initial value (starter factory setting, see page 40).

2nd motor adjustment functions

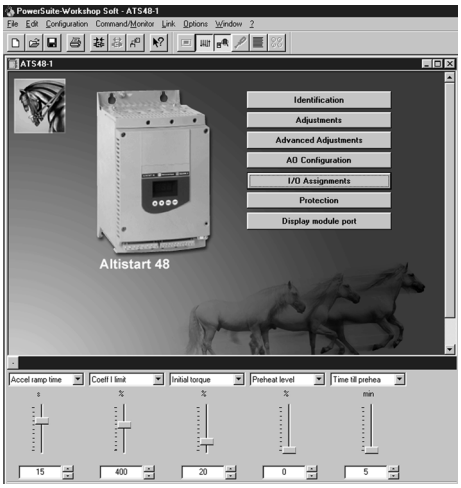
In order to access the 2nd motor adjustment functions, one logic input must be assigned to the second set of motor parameters function. The adjustment functions and ranges are identical for both sets of motor parameters.
The settings are as follows (see page 41):

- Nominal motor current
- Limiting current
- Acceleration ramp time
- Initial starting torque
- Deceleration ramp time
- Threshold for changing to freewheel stop mode at the end of deceleration
- Maximum torque limit

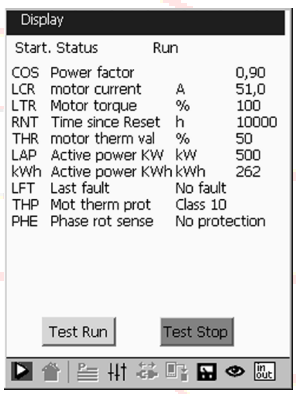
Communication functions

The Altistart 48 is supplied with an RS 485 multidrop serial link with Modbus protocol as standard. The serial link is configured in the Communication menu using:

- The address of the starter, which can be set between 0 and 31
- The communication speed, which can be set at: 4800, 9600 or 19200 bps
- The format of the communication data. The following formats can be selected:
  - 8 data bits, odd parity, 1 stop bit
  - 8 data bits, even parity, 1 stop bit
  - 8 data bits, no parity, 1 stop bit
  - 8 data bits, no parity, 2 stop bits
- The time-out, which can be set between 1 and 60 s



Displaying the commands and settings with PowerSuite on PC



Monitoring the parameters with PowerSuite on PPC

PowerSuite advanced dialogue solutions

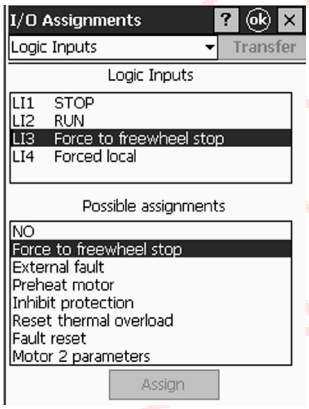
The PowerSuite advanced dialogue solutions (see pages 18 and 19) offer the following advantages:

- Connection to the Altistart 48 and access to the adjustment, monitoring and control functions
- Display of messages in plain text in 5 languages (English, French, German, Spanish and Italian)
- Preparation and saving of settings to hard disk
- Comparison and editing of settings using office automation tools
- Downloading of starter settings to the PC and uploading from the PC to the starter

Application monitoring functions

The monitoring functions provide the following information:

- Cosine φ, displayed between 0.00 and 1.00
- Motor thermal state: 100% corresponds to the thermal state of the motor consuming the permanently set nominal current
- Motor current: displayed in amperes between 0 and 999 A and in kilo amperes between 1000 and 9999 A
- The operating time corresponding to the total number of starter operating hours during heating, acceleration, steady state, deceleration, braking and continuous bypass operation. It is displayed in hours between 0 and 999 hours and in kilo hours between 1000 and 65536 hours.
- The active power is displayed between 0 and 255%, where 100% corresponds to the power at the set nominal current and at full voltage.
- The motor torque is displayed between 0 and 255%, where 100% corresponds to the nominal torque.
- The active power consumed is displayed in kW. The line voltage value must be configured. The accuracy of this setting will depend on the error between the voltage configured and the actual voltage.
- Power in kW/h displayed with PowerSuite
- The following starter states are shown in the display of the current state:
  - Starter without run command and power not supplied
  - Starter without run command and power supplied
  - Acceleration/deceleration in progress
  - Steady state operation
  - Braking in progress
  - Starter in current limiting mode
  - Starting time delay not elapsed
- Last fault. Displays the last fault which occurred.
- Phase rotation direction. Displays the direction of rotation (direct or indirect).
- **Terminal locking code**
  - An access code can be used to protect access to the adjustment and configuration parameters of the starter. Only the monitoring parameters will then be visible.



Assigning the logic inputs with PowerSuite on PPC

Logic input application functions

The starter has 4 logic inputs:

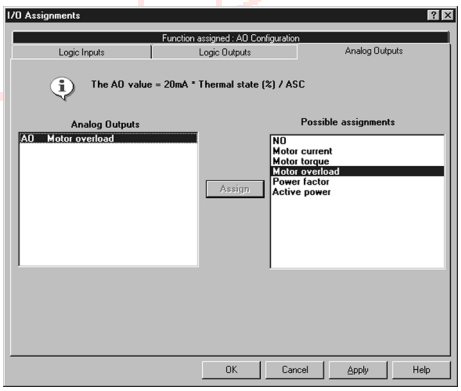
■ **2 logic inputs (RUN and STOP) are reserved for run/stop commands** which can be sent in the form of stay-put contacts or as pulsed contacts.
□ **2-wire control**: Starting and stopping are controlled by a single logic input. State 1 of the logic input controls starting and state 0 controls stopping.
□ **3-wire control**: Starting and stopping are controlled by 2 separate logic inputs. A stop is obtained on opening (state 0) the STOP input.
The pulse on the RUN input is stored until the stop input opens.

■ **2 logic inputs (LI3 and LI4) can be configured with the following functions**:
□ **Freewheel stop**: When combined with a braked stop or decelerated stop command, activating the logic input will stop the motor in freewheel mode.
□ **External fault**: Enables the starter to detect an external user fault (level, pressure, etc.). When the contact is open, the starter changes to fault mode.
□ **Motor preheating**: Used to prevent the motor from freezing or to prevent temperature variations which may cause condensation. When the logic input is activated, an adjustable current flows through the motor after a time delay which can be set between 0 and 999 s. This current heats the motor without causing it to rotate. This function is not compatible with the following functions: connection to the motor delta terminal and cascading.
□ **Force to local control mode**: If a serial link is used, this function can be used to change from line mode (control via serial link) to local mode (control via the terminal).
□ **Inhibit all protection**: Enables the forced operation of the starter in an emergency by overriding the main faults (smoke extraction system for example).
Warning: This type of use invalidates the starter warranty.
□ **Reset motor thermal fault**: Enables the fault to be reset remotely.
□ **Activation of the cascade function**: In this case, the motor thermal protection is disabled and relay R1 is configured as the fault isolation relay. Can be used to start and decelerate several motors one after the other with a single starter (see application diagram on pages 28 and 29).
□ **Reset all faults**: Enables all faults to be reset remotely.
□ **Second set of motor parameters**: Enables a second set of parameters to be selected to start and decelerate two different motors with a single starter.

Logic output application functions

The starter has 2 logic outputs (LO1 and LO2) which, depending on their configuration, can be used for remote indication of the following states or events:

- Motor thermal alarm: Indicates that the motor thermal state has exceeded the alarm threshold and can be used for example to avoid starting a motor if the thermal reserve is insufficient.
- Motor powered: Indicates that there may be current in the motor.
- Motor overcurrent alarm: The motor current is higher than the threshold set.
- Motor underload alarm: The motor torque is lower than the threshold set.
- Motor PTC probe alarm: Indicates that the thermal state monitored by the PTC motor probe has been exceeded.
- Second set of motor parameters activated



Assigning the analogue output with PowerSuite on PC

Relay and analogue output application functions

The starter has 3 relays, 2 of which are configurable.

- **End of starting relay R2**: Cannot be configured.

The end of starting relay controls the bypass contactor on the starter. It is activated when the motor has completed the starting phase. It is deactivated when a stop command is sent and in the event of a fault. The starter regains control when a braking or deceleration command is sent.

- **Relay R1 application functions**

Relay R1 can be configured as follows:

□ Fault relay: Relay R1 is activated when the starter is powered and there are no faults. It is deactivated when a fault occurs and the motor switches to freewheel mode.

□ Isolating relay: The contact of relay R1 closes when a run command is sent and re-opens when a stop command is sent, at the end of deceleration on a decelerated stop or in the event of a fault. The line contactor is deactivated and the motor is isolated from the line supply
(see application diagram page 25).

- **Relay R3 application functions**

Relay R3 is configured to indicate the same states or events as logic outputs LO1 or LO2 (see above).

- **Analogue current output AO application functions**

□ The analogue output AO provides an image of the following values:
motor current, motor torque, motor thermal state, cosine φ, active power.

□ The following settings are associated with the analogue output:
- the type of signal supplied: 0-20 mA or 4-20 mA
- the scale setting of the signal. The function associates the maximum amplitude of the analogue output (20 mA) with a percentage of the nominal value of the parameter, which can be set between 50% and 500%.

Function compatibility table

Functions	Decelerating stop	Dynamic braking stop	Forced freewheel stop	Thermal protection	Motor phase loss detection	Connection to the motor delta terminal	Tests on low power motor	Cascaded motors	Motor preheating
Decelerating stop									
Dynamic braking stop									
Forced freewheel stop									
Thermal protection									*(1)*
Motor phase loss detection						*(1)*			*(1)*
Connection to the motor delta terminal					*(1)*				
Tests on low power motor									
Cascaded motors									
Motor preheating				*(2)*	*(1)*				

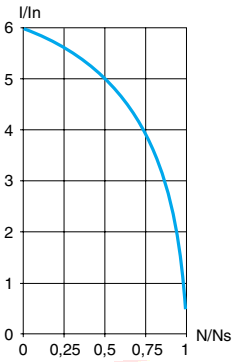
Compatible functions
Incompatible functions
Not applicable

(1) Motor phase loss not detected.

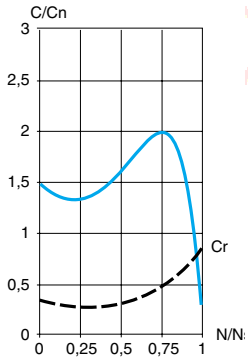
(2) Thermal protection is not provided during motor preheating.

Soft starters
Conventional starting of three-phase asynchronous motors

Direct starting



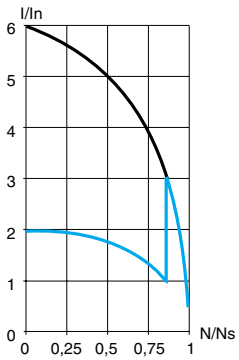
Starting current



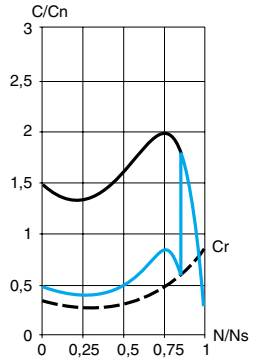
Starting torque

- Starting current: 4 to 8 times the nominal current
- Starting torque: 0.5 to 1.5 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, low and medium power
  - On-load starting
  - High current peak and voltage drop
  - Simple device
  - Sudden starting for the mechanism
- No parameter adjustment

"Star-delta" starting



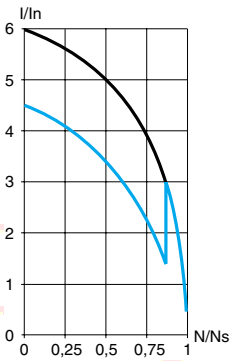
Starting current



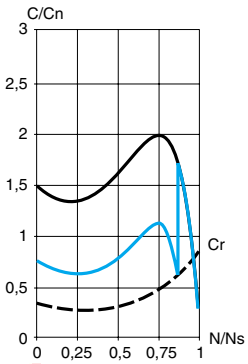
Starting torque

- Starting current: 1.8 to 2.6 times the nominal current
- Starting torque: 0.5 times the nominal torque
- Characteristics:
  - Motor with 6 terminals
  - No-load or low resistive torque starting
  - High current peaks and torque when changing to "star-delta" mode
  - A device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

Rheostatic stator starting



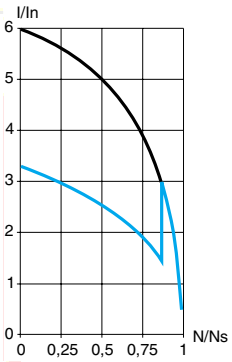
Starting current



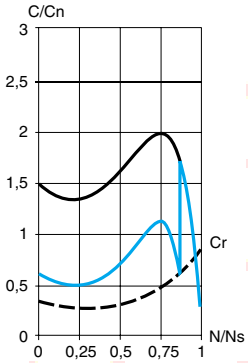
Starting torque

- Starting current: 4.5 times the nominal current
- Starting torque: 0.5 to 0.75 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, high power
  - Starting with increasing resistive torque
  - High current peak
  - A large, bulky device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

Auto transformer starting



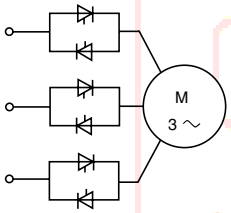
Starting current



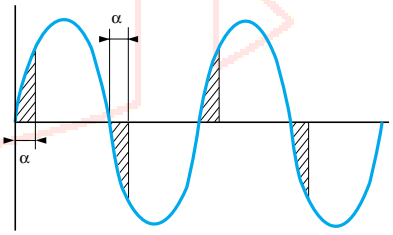
Starting torque

- Starting current: 1.7 to 4 times the nominal current
- Starting torque: 0.4 to 0.85 times the nominal torque
- Characteristics:
  - Motor with 3 terminals, high power
  - Large voltage drop and current peak when connected at full voltage
  - A complex, bulky device requiring maintenance
  - Subject to mechanical stress when starting
- No parameter adjustment

Conventional electronic starting with variable voltage and current limiting



Schematic diagram



Firing angle

■ A controller with 6 thyristors connected head to tail in each line phase is used to power the three-phase asynchronous motor by gradually increasing the voltage on start-up.

□ Depending on the firing time and angle of the thyristors, it can be used to supply a voltage which will gradually increase at a fixed frequency.

□ The gradual increase in the output voltage can either be controlled by the acceleration ramp, or by the value of the limiting current, or linked to both parameters.

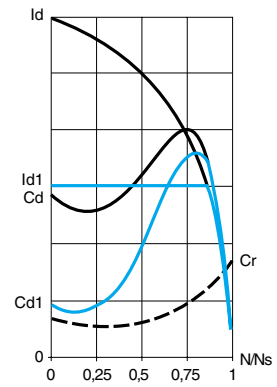


Figure 1

■ Figure 1 shows the behaviour of the torque in relation to the starting current.
Limiting the starting current Is to a preset value Is1 will reduce the starting torque Ts1 to a value which is almost equal to the ratio of the square of currents Is and Is1.
Example
On a motor with the following characteristics: Ts = 2 Tn for Is = 6In, current limiting at Is1= 3 In or 0.5 Is results in a starting torque: Ts1 = Ts x (0.5)2 = 2 Tn x 0.25 = 0.5 Tn.

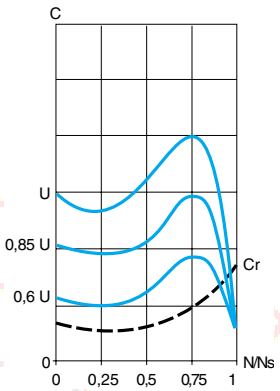


Figure 2

■ Figure 2 shows the torque/speed characteristic of a squirrel cage motor in relation to the supply voltage.
The torque varies like the square of the voltage at a fixed frequency. The gradual increase in the voltage prevents the instantaneous current peak on power-up.

Advantages of starting with the Altistart 48

■ Conventional electronic starting
To rectify problems caused by:
- mechanical stress when starting
- hydraulic transients during acceleration and deceleration in pump applications

Conventional electronic starting requires the use of several current limits or the switching of several voltage ramps.
The settings become complicated and must be modified every time the load changes.

■ Starting with the Altistart 48
The Altistart 48 torque control enables starting without mechanical stress and the smooth control of hydraulic transients with a single acceleration ramp.
The settings are simple and effective, whatever the load.